Study of an interface sharpening method for large interface tracking within a two-fluid model

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Bubbly flows occurring in nuclear power plants represent a crucial safety issue. However, the large range of bubble diameters and shapes experimentally observed in these complex flows have required the development of new computational approaches. Thus, in this article, a multifield method adapted to a two-fluid model is presented. The small spherical bubbles are followed with a dispersed approach whereas the large deformable ones are located with interface tracking methods. Nevertheless, a special treatment is required to locate precisely these interfaces and to evaluate accurately the local quantities, such as the normal vector and the curvature since the two-fluid model induces a numerical interface smearing. This paper is devoted to the implementation of an interface sharpening equation, which ensures mass conservation and does not affect the physical results. Therefore, the integration of this equation in the numerical scheme of the code is detailed. Criteria to limit the creation of spurious velocities and to recognize the diffused interfaces are also defined. Finally, different validation test cases are proposed including deformable large bubbles and free surfaces.